

**AZ-203.46q**

Number: AZ-203  
Passing Score: 800  
Time Limit: 120 min



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**AZ-203**

**Developing Solutions for Microsoft Azure**

## Testlet 1

### Case Study

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### To start the case study

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### LabelMaker app

Coho Winery produces bottles, and distributes a variety of wines globally. You are developer implementing highly scalable and resilient applications to support online order processing by using Azure solutions.

Coho Winery has a LabelMaker application that prints labels for wine bottles. The application sends **data** to several printers. The application consists of five modules that run independently on virtual machines (VMs). Coho Winery plans to move the application to Azure and continue to support label creation.

External partners send data to the **LabelMaker** application to include artwork and text for custom label designs.

### Data

You identify the following requirements for data management and manipulation:

- Order data is stored as nonrelational JSON and must be queried using Structured Query Language (SQL).
- Changes to the Order data must reflect immediately across all partitions. All reads to the Order data must fetch the most recent writes.

You have the following security requirements:

- Users of Coho Winery applications must be able to provide access to documents, resources, and applications to external partners.
- External partners must use their own credentials and authenticate with their organization's identity management solution.
- External partner logins must be audited monthly for application use by a user account administrator to maintain company compliance.

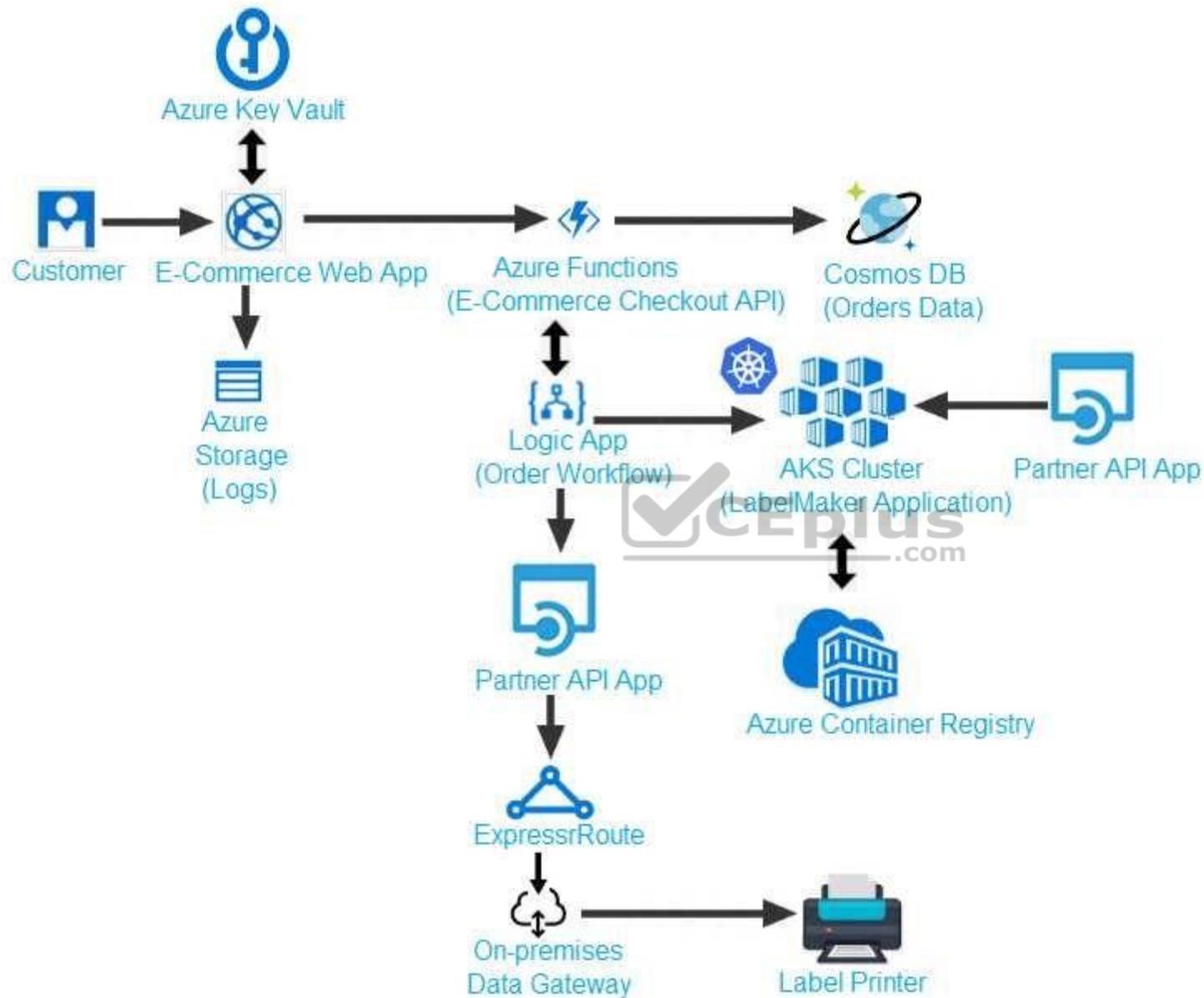
- Storage of e-commerce application settings must be maintained in Azure Key Vault.
- E-commerce application sign-ins must be secured by using Azure App Service authentication and Azure Active Directory (AAD).
- Conditional access policies must be applied at the application level to protect company content
  - The LabelMaker applications must be secured by using an AAD account that has full access to all namespaces of the Azure Kubernetes Service (AKS) cluster.

LabelMaker app

Azure Monitor Container Health must be used to monitor the performance of workloads that are deployed to Kubernetes environments and hosted on Azure Kubernetes Service (AKS).

You must use Azure Container Registry to publish images that support the AKS deployment.





Calls to the Printer API App fail periodically due to printer communication timeouts.

Printer communications timeouts occur after 10 seconds. The label printer must only receive up to 5 attempts within one minute.

The order workflow fails to run upon initial deployment to Azure.

**Order .json**



```
01 {
02   "id" : 1,
03   "customers" : [
04     {
05       "familyName" : "Doe",
06       "givenName" : "John",
07       "customerid" : 5
08     }
09   ],
10   "line_items" : [
11     {
12       "fulfillable_quantity" : 1,
13       "id" : 6,
14       "price" : "199.99",
15       "product_id" : 7513594,
16       "quantity": 1,
17       "requires_shipping" : true,
18       "sku" : "SFC-342-N" ,
19       "title" : "Surface Go",
20       "vendor" : "Microsoft" ,
21       "name" : "Surface Go - 8GB",
22       "taxable" : true
```



### QUESTION 1

You need to implement the e-commerce checkout API.

Which three actions should you perform? Each correct answer presents part of the solution.

**NOTE:** Each correct selection is worth one point.

- A. Set the function template's Mode property to **Webhook** and the Webhook type property to **Generic JSON**.
- B. Create an Azure Function using the HTTP POST function template.
- C. In the Azure Function App, enable Cross-Origin Resource Sharing (CORS) with all origins permitted.
- D. In the Azure Function App, enable Managed Service Identity (MSI).
- E. Set the function template's Mode property to **Webhook** and the Webhook type property to **GitHub**.
- F. Create an Azure Function using the Generic webhook function template.

**Correct Answer:** ABD

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: E-commerce application sign-ins must be secured by using Azure App Service authentication and Azure Active Directory (AAD).

D: A managed identity from Azure Active Directory allows your app to easily access other AAD-protected resources such as Azure Key Vault.

Incorrect Answers:

C: CORS is an HTTP feature that enables a web application running under one domain to access resources in another domain.

References: <https://docs.microsoft.com/en-us/azure/app-service/overview-managed-identity>

### QUESTION 2

You need to provision and deploy the order workflow.



<https://www.vceplus.com/>

Which three components should you include? Each correct answer presents part of the solution.

**NOTE:** Each correct selection is worth one point.

- A. Connections
- B. On-premises Data Gateway
- C. Workflow definition
- D. Resources
- E. Functions

**Correct Answer:** BCE

**Section:** [none]

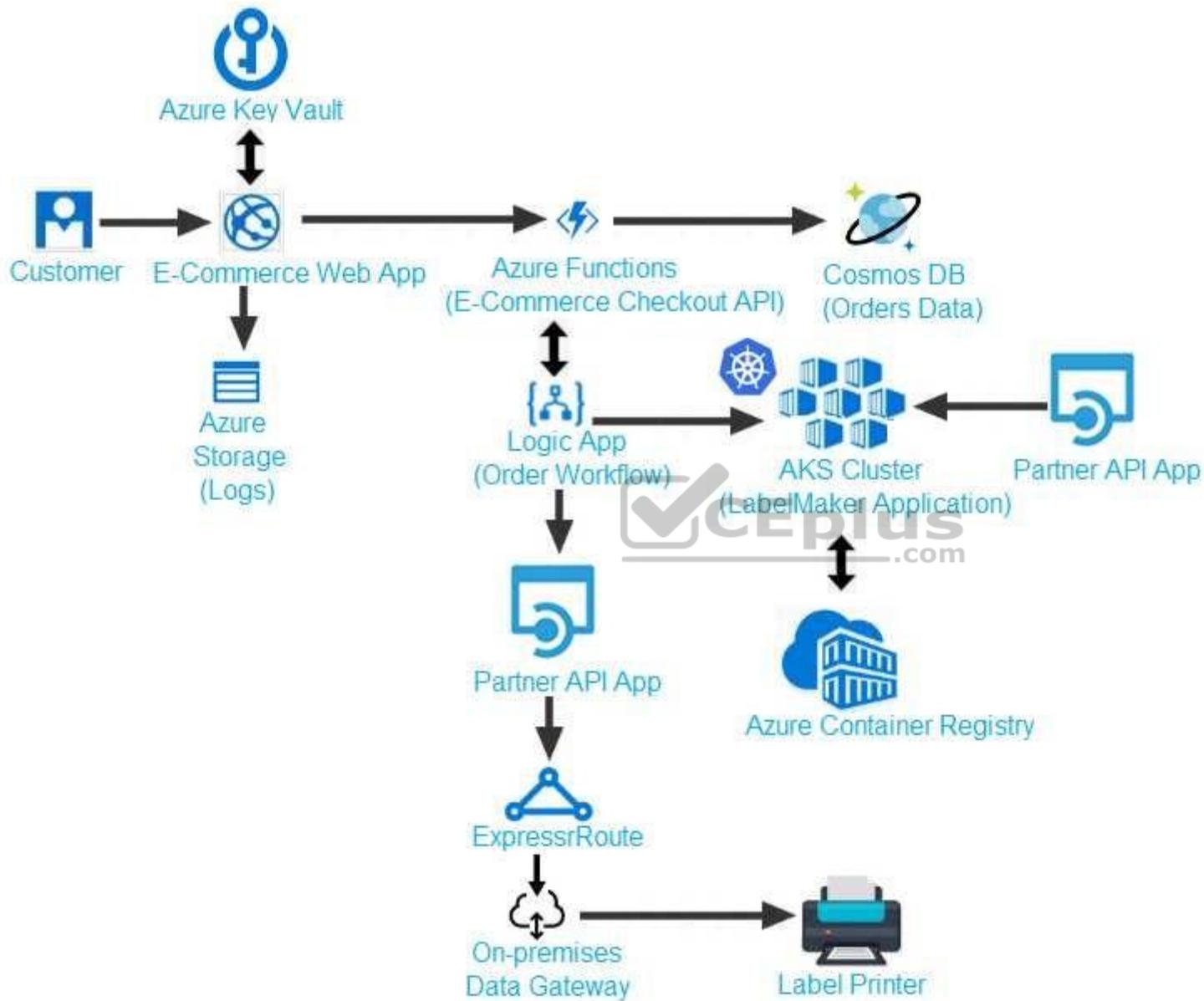
**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: The order workflow fails to run upon initial deployment to Azure.





Question Set 2

### QUESTION 1

You develop a serverless application using several Azure Functions. These functions connect to data from within the code.

You want to configure tracing for an Azure Function App project.

You need to change configuration settings in the host.json file.

Which tool should you use?

- A. Visual Studio
- B. Azure portal
- C. Azure PowerShell
- D. Azure Functions Core Tools (Azure CLI)

**Correct Answer:** B

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

The function editor built into the Azure portal lets you update the function.json file and the code file for a function. The host.json file, which contains some runtime-specific configurations, is in the root folder of the function app.

```
FunctionApp
| - host.json
| - Myfirstfunction
| | - function.json
| | - ...
| - mysecondfunction
| | - function.json
| | - ...
| - SharedCode
| - bin
```

References: <https://docs.microsoft.com/en-us/azure/azure-functions/functions-reference#fileupdate>

### QUESTION 2

You are developing a mobile instant messaging app for a company.

The mobile app must meet the following requirements:

- Support offline data sync.
- Update the latest messages during normal sync cycles.

You need to implement Offline Data Sync.

Which two actions should you perform? Each correct answer presents part of the solution.

**NOTE:** Each correct selection is worth one point.

- A. Retrieve records from Offline Data Sync on every call to the PullAsync method.
- B. Retrieve records from Offline Data Sync using an Incremental Sync.
- C. Push records to Offline Data Sync using an Incremental Sync.
- D. Return the updatedAt column from the Mobile Service Backend and implement sorting by using the column.
- E. Return the updatedAt column from the Mobile Service Backend and implement sorting by the message id.

**Correct Answer:** BE

**Section:** [none]

**Explanation**



**Explanation/Reference:**

Explanation:

B: Incremental Sync: the first parameter to the pull operation is a query name that is used only on the client. If you use a non-null query name, the Azure Mobile SDK performs an incremental sync. Each time a pull operation returns a set of results, the latest updatedAt timestamp from that result set is stored in the SDK local system tables. Subsequent pull operations retrieve only records after that timestamp.

E (not D): To use incremental sync, your server must return meaningful updatedAt values and must also support sorting by this field. However, since the SDK adds its own sort on the updatedAt field, you cannot use a pull query that has its own orderBy clause.

References: <https://docs.microsoft.com/en-us/azure/app-service-mobile/app-service-mobile-offline-data-sync>

### QUESTION 3

DRAG DROP You manage several existing Logic Apps.

You need to change definitions, add new logic, and optimize these apps on a regular basis.

What should you use? To answer, drag the appropriate tools to the correct functionalities. Each tool may be used once, more than once, or not at all. You may need to drag the split bar between panes or scroll to view content.

**NOTE:** Each correct selection is worth one point.

**Select and Place:**

**Answer Area**

Tools	Functionality	Tool
Logic Apps Designer	Edit B2B workflows	
Code View Editor	Edit definitions in JSON	
Enterprise Integration Pack	Visually add functionality	

**Correct Answer:**

**Answer Area**

Tools	Functionality	Tool
Logic Apps Designer	Edit B2B workflows	Enterprise Integration Pack
Code View Editor	Edit definitions in JSON	Code View Editor
Enterprise Integration Pack	Visually add functionality	Logic Apps Designer

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: Enterprise Integration Pack

After you create an integration account that has partners and agreements, you are ready to create a business to business (B2B) workflow for your logic app with the Enterprise Integration Pack.

Box 2: Code View Editor

To work with logic app definitions in JSON, open the Code View editor when working in the Azure portal or in Visual Studio, or copy the definition into any editor that you want.

Box 3: Logical Apps Designer

You can build your logic apps visually with the Logic Apps Designer, which is available in the Azure portal through your browser and in Visual Studio.

References:

<https://docs.microsoft.com/en-us/azure/logic-apps/logic-apps-enterprise-integration-b2b>

<https://docs.microsoft.com/en-us/azure/logic-apps/logic-apps-author-definitions>

<https://docs.microsoft.com/en-us/azure/logic-apps/logic-apps-overview>

#### QUESTION 4

You are implementing an Azure API app that uses built-in authentication and authorization functionality.

All app actions must be associated with information about the current user.

You need to retrieve the information about the current user.

What are two ways to achieve the goal? Each correct answer presents a complete solution.

**NOTE:** Each correct selection is worth one point.

- A. HTTP headers
- B. environment variables
- C. /.auth/me HTTP endpoint
- D. /.auth/login endpoint

**Correct Answer:** AC

**Section:** [none]

**Explanation**

**Explanation/Reference:**

A: After App Service Authentication has been configured, users trying to access your API are prompted to sign in with their organizational account that belongs to the same Azure AD as the Azure AD application used to secure the API. After signing in, you are able to access the information about the current user through the HttpContext.Current.User property.

C: While the server code has access to request headers, client code can access GET /.auth/me to get the same access tokens (

References: <https://docs.microsoft.com/en-us/azure/app-service/app-service-web-tutorial-auth-aad>  
<https://docs.microsoft.com/en-us/sharepoint/dev/spfx/web-parts/guidance/connect-to-api-secured-with-aad>

### QUESTION 5

A company is developing a solution that allows smart refrigerators to send temperature information to a central location.

The solution must receive and store messages until they can be processed. You create an Azure Service Bus instance by providing a name, pricing tier, subscription, resource group, and location.

You need to complete the configuration.

Which Azure CLI or PowerShell command should you run?

```
New-AzureRmServiceBusNamespace  
  -ResourceGroupName fridge-rg  
  -NamespaceName fridge-ns  
  -Location fridge-loc  
az servicebus namespace create  
  - -resource-group fridge-rg  
  - -name fridge-ns  
  - -location fridge-loc
```



A.

B.

```
New-AzureRmResourceGroup
  -Name fridge-rg
  -Location fridge-loc
New-AzureRmServiceBusQueue
  -ResourceGroupName fridge-rg
  -NamespaceName fridge-ns
  -Name fridge-q
  -EnablePartitioning $False
```

C.

D.



**Correct Answer:** B

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

# Create a Service Bus messaging namespace with a unique name. Example:

```
namespaceName=myNameSpace$RANDOM
```

```
az servicebus namespace create --resource-group $resourceGroupName --name $namespaceName --location eastus
```

References: <https://docs.microsoft.com/en-us/azure/service-bus-messaging/service-bus-quickstart-cli>

### QUESTION 6

You are a developer for a SaaS company that offers many web services.

All web services for the company must meet the following requirements:

- Use API Management to access the services ▪
- Use OpenID Connect for authentication. ▪ Prevent anonymous usage

A recent security audit found that several web services can be called without any authentication.

Which API Management policy should you implement?

- A. validate-jwt
- B. jsonp
- C. authentication-certificate
- D. check-header

**Correct Answer:** A

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Add the validate-jwt policy to validate the OAuth token for every incoming request.

Incorrect Answers:

B: The jsonp policy adds JSON with padding (JSONP) support to an operation or an API to allow cross-domain calls from JavaScript browser-based clients. JSONP is a method used in JavaScript programs to request data from a server in a different domain. JSONP bypasses the limitation enforced by most web browsers where access to web pages must be in the same domain.

JSONP - Adds JSON with padding (JSONP) support to an operation or an API to allow cross-domain calls from JavaScript browser-based clients.

References: <https://docs.microsoft.com/en-us/azure/api-management/api-management-howto-protect-backend-with-aad>

## Question Set 1

### QUESTION 1

You use Azure Table storage to store customer information for an application. The data contains customer details and is partitioned by last name.

You need to create a query that returns all customers with the last name Smith.

Which code segment should you use?

- A. `TableQuery.GenerateFilterCondition("PartitionKey", Equals, "Smith")`
- B. `TableQuery.GenerateFilterCondition("LastName", Equals, "Smith")`
- C. `TableQuery.GenerateFilterCondition("PartitionKey", QueryComparisons.Equal, "Smith")`
- D. `TableQuery.GenerateFilterCondition("LastName", QueryComparisons.Equal, "Smith")`

**Correct Answer:** C

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Retrieve all entities in a partition. The following code example specifies a filter for entities where 'Smith' is the partition key. This example prints the fields of each entity in the query results to the console.

Construct the query operation for all customer entities where `PartitionKey="Smith"`.

```
TableQuery<CustomerEntity> query = new TableQuery<CustomerEntity>().Where(TableQuery.GenerateFilterCondition("PartitionKey", QueryComparisons.Equal, "Smith"));
```

References: <https://docs.microsoft.com/en-us/azure/cosmos-db/table-storage-how-to-use-dotnet>

### QUESTION 2

HOTSPOT

You are developing a data storage solution for a social networking app.

The solution requires a mobile app that stores user information using Azure Table Storage.

You need to develop code that can insert multiple sets of user information.

How should you complete the code? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

Hot Area:

### Answer Area

```
CloudStorageAccount storageAccount = CloudStorageAccount.Parse(  
    CloudConfigurationManager.GetSetting("StorageConnectionString");  
CloudTableClient tableClient = storageAccount.CreateCloudTableClient();  
CloudTable table = tableClient.GetTableReference("clients");  
Table.CreateIfNotExists();
```

```
op = new
```

▼
TableOperation
TableBatchOperator
TableEntity
TableQuery

```
op = new
```

▼
TableOperation
TableBatchOperator
TableEntity
TableQuery

```
());
```

```
table.
```

▼
ExecuteBatch
Execute
Insert
InsertOrMerge

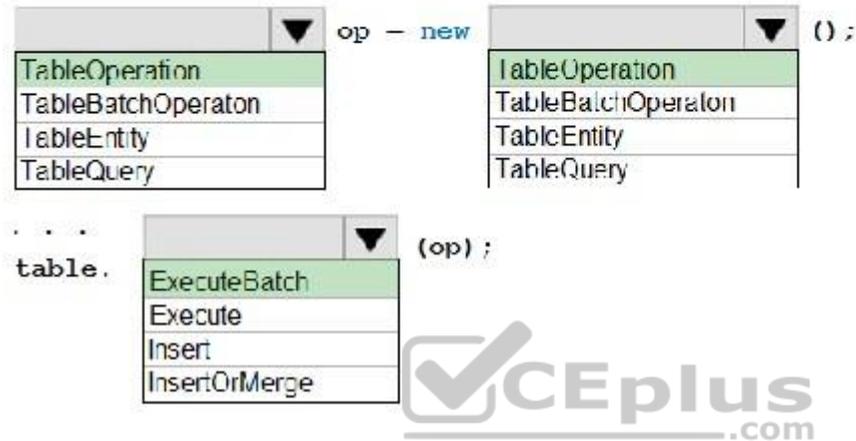
```
(op);
```



Correct Answer:

## Answer Area

```
CloudStorageAccount storageAccount = CloudStorageAccount.Parse(
    CloudConfigurationManager.GetSetting("StorageConnectionString"));
CloudTableClient tableClient = storageAccount.CreateCloudTableClient();
CloudTable table = tableClient.GetTableReference("clients");
Table.CreateIfNotExists();
```



op = new

TableOperation
TableBatchOperaton
TableEntity
TableQuery

(op) ;

TableOperation
TableBatchOperaton
TableEntity
TableQuery

table.

ExecuteBatch
Execute
Insert
InsertOrMerge

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1, Box 2: TableBatchOperation

Create the batch operation.

```
TableBatchOperation op = new TableBatchOperation();
```

Box 3: ExecuteBatch /

Execute the batch operation.

```
table.ExecuteBatch(op);
```

**Note:** You can insert a batch of entities into a table in one write operation. Some other notes on batch operations:

You can perform updates, deletes, and inserts in the same single batch operation.

A single batch operation can include up to 100 entities.

All entities in a single batch operation must have the same partition key.

While it is possible to perform a query as a batch operation, it must be the only operation in the batch.

References: <https://docs.microsoft.com/en-us/azure/cosmos-db/table-storage-how-to-use-dotnet>

### QUESTION 3

You must implement Application Insights instrumentation capabilities utilizing the Azure Mobile Apps SDK to provide meaningful analysis of user interactions with a mobile app.

You need to capture the data required to implement the Usage Analytics feature of Application Insights.

Which three data values should you capture? Each correct answer presents part of the solution.

**NOTE:** Each correct selection is worth one point.

- A. Trace
- B. Session Id
- C. Exception
- D. User Id
- E. Events

**Correct Answer:** ADE

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Application Insights is a service for monitoring the performance and usage of your apps. This module allows you to send telemetry of various kinds (events, traces, etc.) to the Application Insights service where your data can be visualized in the Azure Portal.

Application Insights manages the ID of a session for you.

References: <https://github.com/microsoft/ApplicationInsights-Android>

### QUESTION 4

You develop a solution that uses an Azure SQL Database to store user information for a mobile app.

The app stores sensitive information about users.

You need to hide sensitive information from developers that query the data for the mobile app.



Which three items must you identify when configuring dynamic data masking? Each correct answer presents a part of the solution.

**NOTE:** Each correct selection is worth one point.

- A. Column
- B. Table
- C. Trigger
- D. Index
- E. Schema

**Correct Answer:** ABE

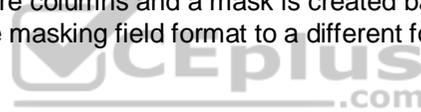
**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

In the Dynamic Data Masking configuration page, you may see some database columns that the recommendations engine has flagged for masking. In order to accept the recommendations, just click Add Mask for one or more columns and a mask is created based on the default type for this column. You can change the masking function by clicking on the masking rule and editing the masking field format to a different format of your choice.



Dynamic Data Masking  
demo\_database

Save Discard Add Mask

 Downlevel clients require the use of Security Enabled Connection Strings. 

Masking Rules

MASK NAME	MASK FUNCTION
You haven't created any masking rules.	

SQL users excluded from masking (administrators are always excluded) 

*SQL users excluded from masking (administrators are always excluded)* 

Recommended fields to mask

SCHEMA	TABLE	COLUMN	
SalesLT	Customer	FirstName	<b>ADD MASK</b>
SalesLT	Customer	LastName	<b>ADD MASK</b>
SalesLT	Customer	EmailAddress	<b>ADD MASK</b>
SalesLT	Customer	Phone	<b>ADD MASK</b>
SalesLT	CustomerAddress	AddressID	<b>ADD MASK</b>

References: <https://docs.microsoft.com/en-us/azure/sql-database/sql-database-dynamic-data-masking-get-started-portal>

### QUESTION 5

A company uses Azure SQL Database to store data for an app. The data includes sensitive information.

You need to implement measures that allow only members of the managers group to see sensitive information.

Which two actions should you perform? Each correct answer presents part of the solution.

**NOTE:** Each correct selection is worth one point.

- A. Include the managers group.
- B. Exclude the managers group.
- C. Exclude the administrators group.
- D. Navigate to the following URL:

```
PUT https://management.azure.com/subscriptions/00000000-1111-2222-3333-444444444444  
/resourceGroups/rg01/providers/Microsoft.Sql/servers/server01/databases/customers  
/transparentDataEncryption/current?api-version=2014-04-01
```

- E. Run the following Azure PowerShell command:

```
New-AzureRmSqlDatabaseDataMaskingRule -SchemaName "dbo" -TableName "customers" ` -ColumnName "ssn" -MaskingFunction "Default"
```

**Correct Answer:** BE

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Dynamic data masking helps prevent unauthorized access to sensitive data by enabling customers to designate how much of the sensitive data to reveal with minimal impact on the application layer.

SQL users excluded from masking - A set of SQL users or AAD identities that get unmasked data in the SQL query results.

**Note:** The New-AzureRmSqlDatabaseDataMaskingRule cmdlet creates a data masking rule for an Azure SQL database.

References: <https://docs.microsoft.com/en-us/powershell/module/azurerm.sql/new-azurermsqldatabasedatamaskingrule?view=azurermps-6.13.0>

## QUESTION 6

You develop an app that allows users to upload photos and videos to Azure storage. The app uses a storage REST API call to upload the media to a blob storage account named Account1. You have blob storage containers named Container1 and Container2.

Uploading of videos occurs on an irregular basis.

You need to copy specific blobs from Container1 to Container2 in real time when specific requirements are met, excluding backup blob copies.

What should you do?

- A. Download the blob to a virtual machine and then upload the blob to Container2.
- B. Run the Azure PowerShell command Start-AzureStorageBlobCopy.
- C. Copy blobs to Container2 by using the Put Blob operation of the Blob Service REST API.
- D. Use AzCopy with the Snapshot switch blobs to Container2.

**Correct Answer:** B

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

The Start-AzureStorageBlobCopy cmdlet starts to copy a blob.

Example 1: Copy a named blob

```
C:\PS>Start-AzureStorageBlobCopy -SrcBlob "ContosoPlanning2015" -DestContainer "ContosoArchives" -SrcContainer "ContosoUploads"
```

This command starts the copy operation of the blob named ContosoPlanning2015 from the container named ContosoUploads to the container named ContosoArchives.

References: [https://docs.microsoft.com/en-us/powershell/module/azure.storage/start-azurestorageblobcopy?view=azurermps-](https://docs.microsoft.com/en-us/powershell/module/azure.storage/start-azurestorageblobcopy?view=azurermps-6.13.0)

[6.13.0](https://docs.microsoft.com/en-us/powershell/module/azure.storage/start-azurestorageblobcopy?view=azurermps-6.13.0) Testlet 1

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External partners send data to the **LabelMaker application** to include artwork and text for custom label designs.

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You identify the following requirements for data management and manipulation:

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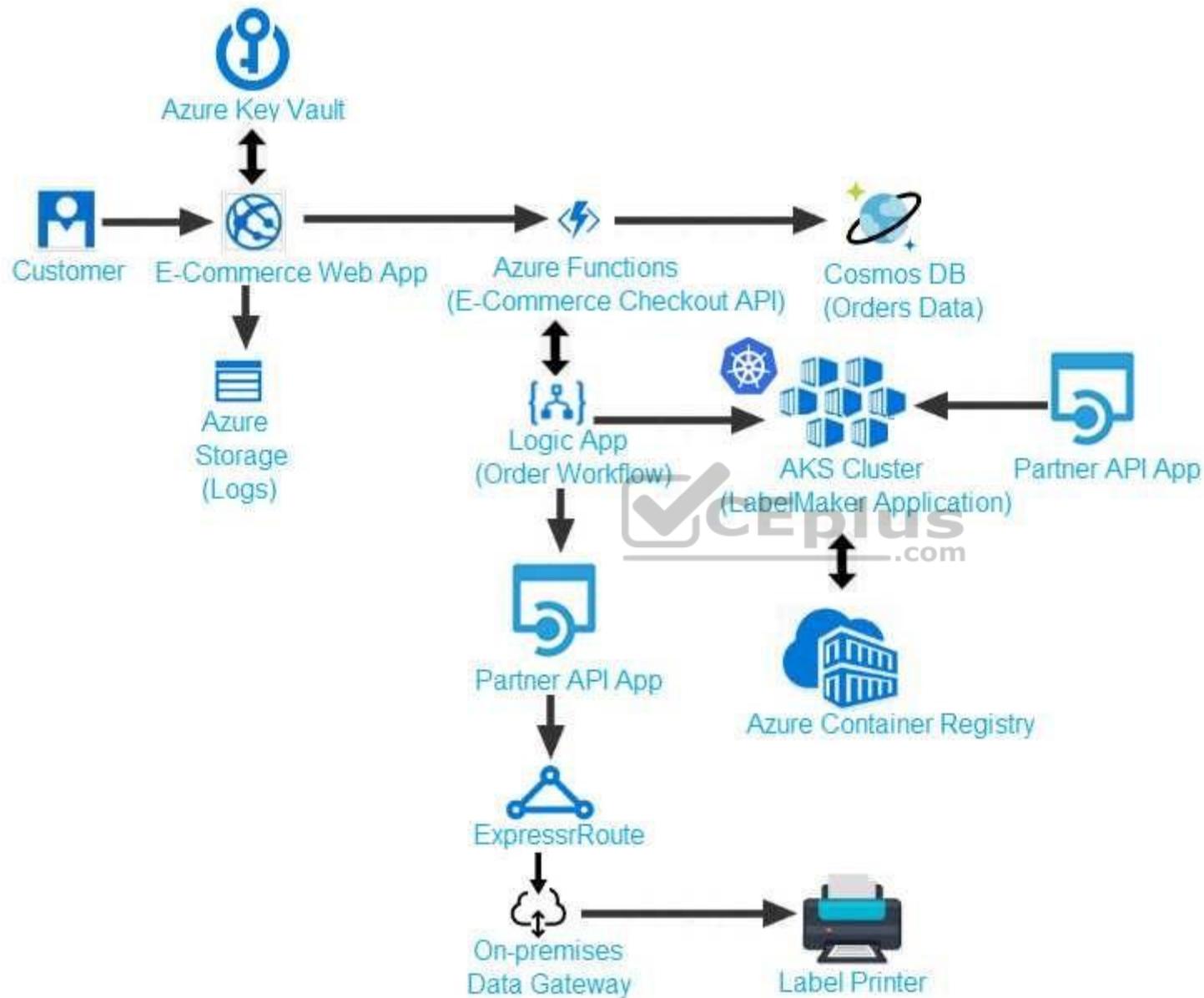
You have the following security requirements:

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  - Storage of e-commerce application settings must be maintained in Azure Key Vault.
  - E-commerce application sign-ins must be secured by using Azure App Service authentication and Azure Active Directory (AAD).
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### LabelMaker app

Azure Monitor Container Health must be used to monitor the performance of workloads that are deployed to Kubernetes environments and hosted on Azure Kubernetes Service (AKS).

You must use Azure Container Registry to publish images that support the AKS deployment.



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**Order .json**



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04     {
05       "familyName" : "Doe",
06       "givenName" : "John",
07       "customerid" : 5
08     }
09   ],
10   "line_items" : [
11     {
12       "fulfillable_quantity" : 1,
13       "id" : 6,
14       "price" : "199.99",
15       "product_id" : 7513594,
16       "quantity": 1,
17       "requires_shipping" : true,
18       "sku" : "SFC-342-N" ,
19       "title" : "Surface Go",
20       "vendor" : "Microsoft" ,
21       "name" : "Surface Go - 8GB",
22       "taxable" : true
```



### QUESTION 1

You need to meet the security requirements for the E-Commerce Web App.

Which two steps should you take? Each correct answer presents part of the solution.

**NOTE:** Each correct selection is worth one point.

- A. Update the E-Commerce Web App with the service principal's client secret.
- B. Enable Managed Service Identity (MSI) on the E-Commerce Web App.
- C. Add a policy to the Azure Key Vault to grant access to the E-Commerce Web App.
- D. Create an Azure AD service principal.

**Correct Answer:** BC

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: E-commerce application sign-ins must be secured by using Azure App Service authentication and Azure Active Directory (AAD).

A managed identity from Azure Active Directory allows your app to easily access other AAD-protected resources such as Azure Key Vault.

T

References: <https://docs.microsoft.com/en-us/azure/app-service/overview-managed-identity>

### QUESTION 2

You need to access user claims in the e-commerce web app.

What should you do first?



<https://www.vceplus.com/>

- A. Using the Azure CLI, enable Cross-origin resource sharing (CORS) from the e-commerce checkout API to the e-commerce web app.

- B. Update the e-commerce web app to read the HTTP request header values.
- C. Assign the Contributor RBAC role to the e-commerce web app by using the Resource Manager create role assignment API.
- D. Write custom code to make a Microsoft Graph API call from the e-commerce web app.

**Correct Answer:** D

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

If you want more information about the user, you'll need to use the Azure AD Graph API.

References: <https://docs.microsoft.com/en-us/azure/architecture/multitenant-identity/claims>

### QUESTION 3

You need to meet the LabelMaker application security requirement.

What should you do?

- A. Create a conditional access policy and assign it to the Azure Kubernetes Service cluster.
- B. Place the Azure Active Directory account into an Azure AD group. Create a ClusterRoleBinding and assign it to the group.
- C. Create a RoleBinding and assign it to the Azure AD account.
- D. Create a Microsoft Azure Active Directory service principal and assign it to the Azure Kubernetes Service (AKS) cluster.

**Correct Answer:** B

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: The LabelMaker applications must be secured by using an AAD account that has full access to all namespaces of the Azure Kubernetes Service (AKS) cluster.

Permissions can be granted within a namespace with a RoleBinding, or cluster-wide with a ClusterRoleBinding.

References:

<https://kubernetes.io/docs/reference/access-authn-authz/rbac/>

**Testlet 2**

**Case Study**

This is a case study. Case studies are not timed separately. You can use as much exam time as you would like to complete each case. However, there may be additional case studies and sections on this exam. You must manage your time to ensure that you are able to complete all questions included on this exam in the time provided.

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### **To start the case study**

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### **Background**

You are a developer for Litware Inc., a SaaS company that provides a solution for managing employee expenses. The solution consists of an ASP.NET Core Web API project that is deployed as an Azure Web App.

### **Overall architecture**

Employees upload receipts for the system to process. When processing is complete, the employee receives a summary report email that details the processing results. Employees then use a web application to manage their receipts and perform any additional tasks needed for reimbursement.

### **Receipt processing**

Employees may upload receipts in two ways:

- Uploading using an Azure Files mounted folder
- Uploading using the web application

### **Data Storage**

Receipt and employee information is stored in an Azure SQL database.

### **Documentation**

Employees are provided with a getting started document when they first use the solution. The documentation includes details on supported operating systems for Azure File upload, and instructions on how to configure the mounted folder.

### **Solution details**

### **Users table**

Column	Description
UserId	unique identifier for and employee
ExpenseAccount	employees expense account number in the format 1234-123-1234
AllowedAmount	limit of allowed expenses before approval is needed
SupervisorId	unique identifier for employee's supervisor
SecurityPin	value used to validate user identity

## Web Application

You enable MSI for the Web App and configure the Web App to use the security principal name.

## Processing

Processing is performed by an Azure Function that uses version 2 of the Azure Function runtime. Once processing is completed, results are stored in Azure Blob Storage and an Azure SQL database. Then, an email summary is sent to the user with a link to the processing report. The link to the report must remain valid if the email is forwarded to another user.

## Requirements

### Receipt processing

Concurrent processing of a receipt must be prevented.

### Logging

Azure Application Insights is used for telemetry and logging in both the processor and the web application. The processor also has TraceWriter logging enabled. Application Insights must always contain all log messages.

### Disaster recovery

Regional outage must not impact application availability. All DR operations must not be dependent on application running and must ensure that data in the DR region is up to date.

### Security

- Users' SecurityPin must be stored in such a way that access to the database does not allow the viewing of SecurityPins. The web application is the only system that should have access to SecurityPins.
- All certificates and secrets used to secure data must be stored in Azure Key Vault.
- You must adhere to the Least Privilege Principal and provide privileges which are essential to perform the intended function.
- All access to Azure Storage and Azure SQL database must use the application's Managed Service Identity (MSI)
- Receipt data must always be encrypted at rest.
- All data must be protected in transit.

- User's expense account number must be visible only to logged in users. All other views of the expense account number should include only the last segment with the remaining parts obscured.
- In the case of a security breach, access to all summary reports must be revoked without impacting other parts of the system.

## **Issues**

### **Upload format issue**

Employees occasionally report an issue with uploading a receipt using the web application. They report that when they upload a receipt using the Azure File Share, the receipt does not appear in their profile. When this occurs, they delete the file in the file share and use the web application, which returns a 500 Internal Server error page.

### **Capacity issue**

During busy periods, employees report long delays between the time they upload the receipt and when it appears in the web application.

### **Log capacity issue**

Developers report that the number of log messages in the trace output for the processor is too high, resulting in lost log messages.

### **Processing.cs**



```
PC01 public static class Processing
PC02 {
PC03     public static class Function
PC04     {
PC05         [FunctionName ("IssueWork")]
PC06         public static async Task Run ([TimerTrigger("0 */5" ****")] TimerInfo timer, ILogger log)
PC07         {
PC08             var container = await GetCloudBlobContainer();
PC09             foreach (var fileItem in await ListFiles())
PC10             {
PC11                 var file = new CloudFile (fileItem.StorageUri.PrimaryUri);
PC12                 var ms = new MemoryStream();
PC13                 await file.DownloadToStreamAsync(ms);
PC14                 var blob = container.GetBlockBlobReference (fileItem.Uri.ToString());
PC15                 await blob.UploadFromStreamAsync(ms);
PC16             }
PC17         }
PC18     }
PC19     private static CloudBlockBlob GetDRBlob (CloudBlockBlob sourceBlob)
PC20     {
PC21         . . .
PC22     }
PC23     private static async Task<CloudBlobContainer> GetCloudBlobContainer()
PC24     {
PC25         var cloudBlobClient = new CloudBlobClient (new Uri(" . . ."), await GetCredentials());
PC26
PC27         await cloudBlobClient.GetRootContainerReference().CreatIfNotExistAsync();
PC28         return cloudBlobClient.GetRootContainerReference();
PC29     }
PC30     private static async Task<StorageCredentials> GetCredentials()
PC31     {
PC32         . . .
PC33     }
```

#### Database.cs

```
DB01 public class Database
DB02 {
DB03     private string ConnectionString =
DB04
DB05     public async Task<object> LoadUserDetails(string userId)
DB06     {
DB07
DB08     return await policy.ExecuteAsync (async () =>
DB09     {
DB10         using (var connection = new SqlConnection (ConnectionString))
DB11         {
DB12             await connection.OpenAsync();
DB13             using (var command = new SqlCommand("_", connection))
DB14             using (var reader = command.ExecuteReader())
DB15             {
DB16                 -
DB17             }
DB18         }
DB19     }
DB20 }
DB21 }
```

#### ReceiptUploader.cs

```
RU01 public class ReceiptUploader
RU02 {
RU03     public async Task UploadFile(string file, byte[ ] binary)
RU04     {
RU05         var httpClient = new HttpClient();
RU06         var response = await httpClient.PutAsync( "...", new ByteArrayContent(binary));
RU07         while (ShouldRetry (response))
RU08         {
RU09             response = await httpClient.PutAsync ( "...", new ByteArrayContent(binary));
RU10         }
RU11     }
RU12 private bool ShouldRetry(HttpResponseMessage response)
RU13 {
RU14
RU15     }
RU16 }
```

ConfigureSSE.ps1

```
CS01 $storageAccount = Get-AzureRmStorageAccount -ResourceGroupName "...\" -AccountName "...\"
CS02 $keyVault = Get-AzureRmKeyVault -VaultName "...\"
CS03 $key = Get-AzureKeyVaultKey -VaultName $keyVault.VaultName -Name "...\"
CS04 Set-AzureRmKeyVaultAccessPolicy'
CS05 -VaultName $keyVault.VaultName'
CS06 -ObjectId $storageAccount.Identity.PrincipalId'
CS07
CS08
CS09 Set-AzureRmStorageAccount\"
CS10 -ResourceGroupName $storageAccount.ResourceGroupName'
CS11 -AccountName $storageAccount.StorageAccountName'
CS12 -EnableEncryptionService File `
CS13 -KeyvaultEncryption'
CS14 -KeyName $key.Name
CS15 -KeyVersion $key.Version'
CS16 -KeyVaultUri $keyVault.VaultUri
```



#### QUESTION 1

**Note:** This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.

**After you answer a question in this question, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.**

You need to ensure that the SecurityPin security requirements are met.

Solution: Enable Always Encrypted for the SecurityPin column using a certificate based on a trusted certificate authority. Update the Getting Started document with instructions to ensure that the certificate is installed on user machines.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** B

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Enable Always Encrypted is correct, but only the WebAppIdentity service principal should be given access to the certificate.

Scenario: Users' SecurityPin must be stored in such a way that access to the database does not allow the viewing of SecurityPins. The web application is the only system that should have access to SecurityPins.

**QUESTION 2**

**Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.**

**After you answer a question in this question, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.**

You need to ensure that the SecurityPin security requirements are met.

Solution: Using the Azure Portal, add Data Masking to the SecurityPin column, and exclude the dbo user. Add a SQL security policy with a filter predicate based on the user identity.

Does the solution meet the goal?

- A. Yes
- B. No



**Correct Answer: B**

**Section: [none]**

**Explanation**

**Explanation/Reference:**

Explanation:

Instead of DataMasing, enable Always Encrypted for the SecurityPin column.

Scenario: Users' SecurityPin must be stored in such a way that access to the database does not allow the viewing of SecurityPins. The web application is the only system that should have access to SecurityPins.

**QUESTION 3**

**Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.**

**After you answer a question in this question, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.**

You need to ensure that the SecurityPin security requirements are met.

Solution: Enable Always Encrypted for the SecurityPin column using a certificate contained in Azure Key Vault and grant the WebAppIdentity service principal access to the certificate.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** A

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: Users' SecurityPin must be stored in such a way that access to the database does not allow the viewing of SecurityPins. The web application is the only system that should have access to SecurityPins.

#### QUESTION 4

You need to ensure the security policies are met.

What code do you add at line CS07?

- A. -PermissionsToCertificates create, encrypt, decrypt
- B. -PermissionsToKeys wrapkey, unwrapkey, get
- C. -PermissionsToCertificates wrapkey, unwrapkey, get
- D. -PermissionsToKeys create, encrypt, decrypt

**Correct Answer:** A

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: All certificates and secrets used to secure data must be stored in Azure Key Vault.

You must adhere to the principle of least privilege and provide privileges which are essential to perform the intended function.

The Set-AzureRmKeyVaultAccessPolicy parameter -PermissionsToKeys specifies an array of key operation permissions to grant to a user or service principal. The acceptable values for this parameter: decrypt, encrypt, unwrapKey, wrapKey, verify, sign, get, list, update, create, import, delete, backup, restore, recover, purge

Incorrect Answers:



A, C: The Set-AzureRmKeyVaultAccessPolicy parameter -PermissionsToCertificates specifies an array of certificate permissions to grant to a user or service principal. The acceptable values for this parameter: get, list, delete, create, import, update, managecontacts, getissuers, listissuers, setissuers, deleteissuers, manageissuers, recover, purge, backup, restore

References: <https://docs.microsoft.com/en-us/powershell/module/azurerm/keyvault/set-azurermkeyvaultaccesspolicy>

### QUESTION 5

**Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.**

**After you answer a question in this question, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.**

You need to ensure that the SecurityPin security requirements are met.

Solution: Configure the web application to connect to the database using the WebAppIdentity security principal. Using the Azure Portal, add Data Masking to the SecurityPin column and exclude the WebAppIdentity service principal.

Does the solution meet the goal?

- A. Yes
- B. No



**Correct Answer: A**

**Section: [none]**

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: Users' SecurityPin must be stored in such a way that access to the database does not allow the viewing of SecurityPins. The web application is the only system that should have access to SecurityPins.

All certificates and secrets used to secure data must be stored in Azure Key Vault.

**Testlet 3**

**Case study**

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### **Background**

You are a developer for Proseware, Inc. You are developing an application that applies a set of governance policies for Proseware's internal services, external services, and applications. The application will also provide a shared library for common functionality. **Requirements Policy service**

You develop and deploy a stateful ASP.NET Core 2.1 web application named Policy service to an Azure App Service Web App. The application reacts to events from Azure Event Grid and performs policy actions based on those events.

The application must include the Event Grid Event ID field in all Application Insights telemetry.

Policy service must use Application Insights to automatically scale with the number of policy actions that it is performing.

### **Policies**

#### **Log Policy**

All Azure App Service Web Apps must write logs to Azure Blob storage. All log files should be saved to a container named **logdrop**. Logs must remain in the container for 15 days.

#### **Authentication events**

Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.

#### **PolicyLib**

You have a shared library named **PolicyLib** that contains functionality common to all ASP.NET Core web services and applications. The **PolicyLib** library must:

- Exclude non-user actions from Application Insights telemetry.
- Provide methods that allow a web service to scale itself

- Ensure that scaling actions do not disrupt application usage

## **Other**

### **Anomaly detection service**

You have an anomaly detection service that analyzes log information for anomalies. It is implemented as an Azure Machine Learning model. The model is deployed as a web service.

If an anomaly is detected, an Azure Function that emails administrators is called by using an HTTP WebHook.

### **Health monitoring**

All web applications and services have health monitoring at the /health service endpoint.

### **Policy loss**

When you deploy Policy service, policies may not be applied if they were in the process of being applied during the deployment.

### **Performance issue**

When under heavy load, the anomaly detection service undergoes slowdowns and rejects connections.

### **Notification latency**

Users report that anomaly detection emails can sometimes arrive several minutes after an anomaly is detected.

Relevant portions of the app files are shown below. Line numbers are included for reference only and include a two-character prefix that denotes the specific file to which they belong.

EventGridController.cs

```
EG01 public class EventGridController : Controller
EG02 {
EG03     public static AsyncLocal<string> EventId = new AsyncLocal<string>();
EG04     public IActionResult Process([FromBody] string eventsJson
EG05     {
EG06         var events = JArray.Parse(eventsJson);
EG07
EG08         foreach (var @event in events)
EG09         {
EG10             EventId.Value = @event ["id"].ToString();
EG11             if (@event["topic"].ToString().Contains("providers/Microsoft.Storage"))
EG12             {
EG13                 SendToAnomalyDetectionService(@event["data"]["url"].ToString());
EG14             }
EG15
EG16             {
EG17                 EnsureLogging(@event["subject"].ToString());
EG18             }
EG19         }
EG20         return null;
EG21     }
EG22     private void EnsureLogging(string resource)
EG23     {
EG24         . . .
EG25     }
EG26     private async Task SendToAnomalyDetectionService(string uri)
EG27     {
EG28         var content = GetLogData(uri);
EG29         var scoreRequest = new
EG30         {
EG31             Inputs = new Dictionary<string, List<Dictionary<string, string>>>()
EG32             {
EG33                 {
EG34                     "input1",
```

```
EG35     new List<Dictionary<string, string>>()
EG36     {
EG37         new Dictionary<string, string>()
EG38         {
EG39             {
EG40                 "logcontent", content
EG41             }
EG42         }
EG43     }
EG44     },
EG45     },
EG46     GlobalParameters = new Dictionary<string, string>() { }
EG47 };
EG48 var result = await (new HttpClient()).PostAsJsonAsync(".", scoreRequest);
EG49 var rawModelResult = await result.Content.ReadAsStringAsync();
EG50 var modelResult = JObject.Parse(rawModelResult);
EG51 if (modelResult["notify"].HasValues)
EG52 {
EG53     . . .
EG54 }
EG55 }
EG56 private (string name, string resourceGroup) ParseResourceId(string
resourceId)
EG57 {
EG58     . . .
EG59 }
EG60 private string GetLogData(string uri)
EG61 {
EG62     . . .
EG63 }
EG64 static string BlobStoreAccountSAS(string containerName)
EG65 {
EG66     . . .
EG67 }
EG68 }
```

Relevant portions of the app files are shown below. Line numbers are included for reference only and include a two-character prefix that denotes the specific file to which they belong.

```
LoginEvent.cs
LE01 public class LoginEvent
LE02 {
LE03
LE04 public string subject { get; set; }
LE05 public DateTime eventTime { get; set; }
LE06 public Dictionary<string, string> data { get; set; }
LE07 public string Serialize()
LE08 {
LE09     return JsonConvert.SerializeObject(this);
LE10 }
LE11 }
```

#### QUESTION 1

**Note:** This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.

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You need to ensure that authentication events are triggered and processed according to the policy.

Solution: Create a new Azure Event Grid subscription for all authentication that delivers messages to an Azure Event Hub. Use the subscription to process signout events.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** B

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Use a separate Azure Event Grid topics and subscriptions for sign-in and sign-out events.

Scenario: Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.



## Question Set 4

### QUESTION 1

You are developing an internal website for employees to view sensitive data. The website uses Azure Active Directory (AAD) for authentication.

You need to implement multifactor authentication for the website.

What should you do? Each correct answer presents part of the solution.

**NOTE:** Each correct selection is worth one point.

- A. Upgrade to Azure AD Premium.
- B. In Azure AD conditional access, enable the baseline policy.
- C. In Azure AD, create a new conditional access policy.
- D. In Azure AD, enable application proxy.
- E. Configure the website to use Azure AD B2C.

**Correct Answer:** AC

**Section:** [none]

**Explanation**



**Explanation/Reference:**

Explanation:

A: Multi-Factor Authentication comes as part of the following offerings:

- Azure Active Directory Premium licenses - Full featured use of Azure Multi-Factor Authentication Service (Cloud) or Azure Multi-Factor Authentication Server (On-premises).
- Multi-Factor Authentication for Office 365
- Azure Active Directory Global Administrators

C: MFA Enabled by conditional access policy. It is the most flexible means to enable two-step verification for your users. Enabling using conditional access policy only works for Azure MFA in the cloud and is a premium feature of Azure AD.

References: <https://docs.microsoft.com/en-us/azure/active-directory/authentication/howto-mfa-getstarted>

### QUESTION 2

HOTSPOT

You are developing an Azure App Service hosted ASP.NET Core web app to deliver video on-demand streaming media. You enable an Azure Content Delivery Network (CDN) Standard for the web endpoint. Customer videos are downloaded from the web app by using the following example URL: `http://www.contoso.com/content.p4?quality=1`

All media content must expire from the cache after one hour. Customer videos with varying quality must be delivered to the closest regional point of presence (POP) node.

You need to configure Azure CDN caching rules.

Which options should you use? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

### Answer Area

Setting	Action
Caching behavior	<input type="text" value="Bypass cache"/> Bypass cache Override Set if missing
Cache expiration duration	<input type="text" value="1 second"/> 1 second 1 minute 1 hour 1 day
Query string caching behavior	<input type="text" value="Ignore query strings"/> Ignore query strings Bypass caching for query strings Cache every unique URL

**Correct Answer:**

## Answer Area

Setting	Action
Caching behavior	<div style="border: 1px solid black; padding: 2px;"> <div style="background-color: #cccccc; padding: 2px; display: flex; justify-content: space-between; align-items: center;"> <span></span> <span>▼</span> </div> <div style="padding: 2px;"> <p>Bypass cache</p> <p style="background-color: #d9ead3;">Override</p> <p>Set if missing</p> </div> </div>
Cache expiration duration	<div style="border: 1px solid black; padding: 2px;"> <div style="background-color: #cccccc; padding: 2px; display: flex; justify-content: space-between; align-items: center;"> <span></span> <span>▼</span> </div> <div style="padding: 2px;"> <p>1 second</p> <p>1 minute</p> <p style="background-color: #d9ead3;">1 hour</p> <p>1 day</p> </div> </div>
Query string caching behavior	<div style="border: 1px solid black; padding: 2px;"> <div style="background-color: #cccccc; padding: 2px; display: flex; justify-content: space-between; align-items: center;"> <span></span> <span>▼</span> </div> <div style="padding: 2px;"> <p>Ignore query strings</p> <p>Bypass caching for query strings</p> <p style="background-color: #d9ead3;">Cache every unique URL</p> </div> </div>

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: Override

Override: Ignore origin-provided cache duration; use the provided cache duration instead. This will not override cache-control: no-cache.

Set if missing: Honor origin-provided cache-directive headers, if they exist; otherwise, use the provided cache duration.

Incorrect:

Bypass cache: Do not cache and ignore origin-provided cache-directive headers.

Box 2: 1 hour

All media content must expire from the cache after one hour.

### Box 3: Cache every unique URL

Cache every unique URL: In this mode, each request with a unique URL, including the query string, is treated as a unique asset with its own cache. For example, the response from the origin server for a request for example.ashx?q=test1 is cached at the POP node and returned for subsequent caches with the same query string. A request for example.ashx?q=test2 is cached as a separate asset with its own time-to-live setting.

#### Incorrect Answers:

Bypass caching for query strings: In this mode, requests with query strings are not cached at the CDN POP node. The POP node retrieves the asset directly from the origin server and passes it to the requestor with each request.

Ignore query strings: Default mode. In this mode, the CDN point-of-presence (POP) node passes the query strings from the requestor to the origin server on the first request and caches the asset. All subsequent requests for the asset that are served from the POP ignore the query strings until the cached asset expires.

References: <https://docs.microsoft.com/en-us/azure/cdn/cdn-query-string>

### QUESTION 3

You have an Azure App Services Web App Azure SQL Database instance Azure Storage Account, and an Azure Redis Cache instance in a resource group.

A developer must be able to publish code to the web app. You must grant the developer the Contribute role to the web app.

You need to grant the role.

Which two commands can you use? Each correct answer presents a complete solution.

**NOTE:** Each correct selection is worth one point.

- A. az role assignment create
- B. az role definition create
- C. New-AzureRmRoleAssignment
- D. New-AzureRmRoleDefinition

**Correct Answer:** AC

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

A: The az role assignment create command creates a new role assignment for a user, group, or service principal.

Example: Create role assignment for an assignee. az role assignment create --assignee sp\_name --role a\_role

C: The New-AzureRmRoleAssignment command assigns the specified RBAC role to the specified principal, at the specified scope.

Incorrect Answers:

B, D: Creates a custom role in Azure RBAC.

References: <https://docs.microsoft.com/en-us/cli/azure/role/assignment?view=azure-cli-latest#az-role-assignment-create>  
<https://docs.microsoft.com/en-us/powershell/module/azurerm.resources/new-azurermroleassignment?view=azurerm-ps-6.13.0>

#### QUESTION 4

You provide an Azure API Management managed web service to clients. The back-end web service implements HTTP Strict Transport Security (HSTS).

Every request to the backend service must include a valid HTTP authorization header.

You need to configure the Azure API Management instance with an authentication policy.

Which two policies can you use? Each correct answer presents a complete solution.

NOTE: Each correct selection is worth one point.

- A. OAuth Client Credential Grant
- B. Basic Authentication
- C. Certificate Authentication
- D. Digest Authentication



**Correct Answer:** AC

**Section:** [none]

**Explanation**

**Explanation/Reference:**

**Testlet 1**

#### Case Study

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### **Background**

You are a developer for Proseware, Inc. You are developing an application that applies a set of governance policies for Proseware's internal services, external services, and applications. The application will also provide a shared library for common functionality.

### **Policy service**

You develop and deploy a stateful ASP.NET Core 2.1 web application named Policy service to an Azure App Service Web App. The application reacts to events from Azure Event Grid and performs policy actions based on those events.

The application must include the Event Grid Event ID field in all Application Insights telemetry.

Policy service must use Application Insights to automatically scale with the number of policy actions that it is performing.

### **Other**

#### **Anomaly detection service**

You have an anomaly detection service that analyzes log information for anomalies. It is implemented as an Azure Machine Learning model. The model is deployed as a web service.

If an anomaly is detected, an Azure Function that emails administrators is called by using an HTTP WebHook.

#### **Health monitoring**

All web applications and services have health monitoring at the /health service endpoint.

### **Issues**

#### **Policy loss**

When you deploy Policy service, policies may not be applied if they were in the process of being applied during the deployment.

#### **Performance issue**

When under heavy load, the anomaly detection service undergoes slowdowns and rejects connections.

### **Notification latency**

Users report that anomaly detection emails can sometimes arrive several minutes after an anomaly is detected.

### **Policies**

#### **Log policy**

All Azure App Service Web Apps must write logs to Azure Blob storage. All log files should be saved to a container named logdrop. Logs must remain in the container for 15 days.

#### **Authentication events**

Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.

#### **PolicyLib**

You have a shared library named PolicyLib that contains functionality common to all ASP.NET Core web services and applications. The PolicyLib library must:

- Exclude non-user actions from Application Insights telemetry.
- Provide methods that allow a web service to scale itself.
- Ensure that scaling actions do not disrupt application usage.



Relevant portions of the app files are shown below. Line numbers are included for reference only and include a two-character prefix that denotes the specific file to which they belong.

### EventGridController.cs

```
EG01 public class EventGridController : Controller
EG02 {
EG03     public static AsyncLocal<string> EventId = new AsyncLocal<string>();
EG04     public IActionResult Process([FromBody] string eventsJson)
EG05     {
EG06         var events = JObject.Parse(eventsJson);
EG07
EG08         foreach (var @event in events)
EG09         {
EG10             EventId.Value = @event["id"].ToString();
EG11             if (@event["topic"].ToString(). Contains("providers/Microsoft.Storage"))
EG12             {
EG13                 SendToAnomalyDetection Service(@event["data"]["url"].ToString());
EG14             }
EG15
EG16             {
EG17                 EnsureLogging(@event["subject"].ToString());
EG18             }
EG19         }
EG20         return null;
EG21     }
EG22     private void EnsureLogging(string resource)
EG23     {
EG24         . . .
EG25     }
EG26     private async Task SendToAnomalyDetectionService(string uri)
EG27     {
EG28         var content = GetLogData(uri)
EG29         var scoreRequest = new
EG30         {
EG31             Inputs = new Dictionary<string, List<Dictionary<string, string>>>()
EG32             {
EG33                 {
EG34                     "input1",
```

Relevant portions of the app files are shown below. Line numbers are included for reference only and include a two-character prefix that denotes the specific file to which they belong.

#### LoginEvent.cs

```
LE01 public class LoginEvent
LE02 {
LE03
LE04 public string subject { get ; set ; }
LE05 public DateTime eventTime { get ; set ; }
LE06 public Dictionary<string, string> data { get; set; }
LE07 public string Serialize()
LE08 {
LE09     return JsonConvert.SerializeObject(this);
LE10 }
LE11 }
```

#### QUESTION 1

You need to meet the scaling requirements for Policy Service.



What should you store in Azure Redis Cache?

- A. TempData
- B. HttpContext.Items
- C. ViewState
- D. Session state

**Correct Answer:** D

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Azure Cache for Redis provides a session state provider that you can use to store your session state in-memory with Azure Cache for Redis instead of a SQL Server database.

Scenario: You have a shared library named PolicyLib that contains functionality common to all ASP.NET Core web services and applications. The PolicyLib library must:

Ensure that scaling actions do not disrupt application usage.

References: <https://docs.microsoft.com/en-us/azure/azure-cache-for-redis/cache-aspnet-session-state-provider>

## QUESTION 2

You need to ensure that the solution can meet the scaling requirements for Policy Service.

Which Azure Application Insights data model should you use?

- A. an Application Insights metric
- B. an Application Insights trace
- C. an Application Insights dependency
- D. an Application Insights event

**Correct Answer:** A

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Application Insights provides three additional data types for custom telemetry:

Trace - used either directly, or through an adapter to implement diagnostics logging using an instrumentation framework that is familiar to you, such as Log4Net or System.Diagnostics.

Event - typically used to capture user interaction with your service, to analyze usage patterns.

Metric - used to report periodic scalar measurements.

Scenario:

Policy service must use Application Insights to automatically scale with the number of policy actions that it is performing.

References:

<https://docs.microsoft.com/en-us/azure/azure-monitor/app/data-model>

## Testlet 2

### Case Study

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### Background

You are a developer for Litware Inc., a SaaS company that provides a solution for managing employee expenses. The solution consists of an ASP.NET Core Web API project that is deployed as an Azure Web App.

### Overall architecture

Employees upload receipts for the system to process. When processing is complete, the employee receives a summary report email that details the processing results. Employees then use a web application to manage their receipts and perform any additional tasks needed for reimbursement.

### Receipt processing

Employees may upload receipts in two ways:

- Uploading using an Azure Files mounted folder
- Uploading using the web application



### Data Storage

Receipt and employee information is stored in an Azure SQL database.

### Documentation

Employees are provided with a getting started document when they first use the solution. The documentation includes details on supported operating systems for Azure File upload, and instructions on how to configure the mounted folder.

### Solution details

#### Users table

Column	Description
UserId	unique identifier for and employee
ExpenseAccount	employees expense account number in the format 1234-123-1234
AllowedAmount	limit of allowed expenses before approval is needed
SupervisorId	unique identifier for employee's supervisor
SecurityPin	value used to validate user identity

## Web Application

You enable MSI for the Web App and configure the Web App to use the security principal name.

## Processing

Processing is performed by an Azure Function that uses version 2 of the Azure Function runtime. Once processing is completed, results are stored in Azure Blob Storage and an Azure SQL database. Then, an email summary is sent to the user with a link to the processing report. The link to the report must remain valid if the email is forwarded to another user.

## Requirements

### Receipt processing

Concurrent processing of a receipt must be prevented.

### Logging

Azure Application Insights is used for telemetry and logging in both the processor and the web application. The processor also has TraceWriter logging enabled. Application Insights must always contain all log messages.

### Disaster recovery

Regional outage must not impact application availability. All DR operations must not be dependent on application running and must ensure that data in the DR region is up to date.

## Security

- Users' SecurityPin must be stored in such a way that access to the database does not allow the viewing of SecurityPins. The web application is the only system that should have access to SecurityPins.
- All certificates and secrets used to secure data must be stored in Azure Key Vault.
- You must adhere to the Least Privilege Principal and provide privileges which are essential to perform the intended function.
- All access to Azure Storage and Azure SQL database must use the application's Managed Service Identity (MSI)
- Receipt data must always be encrypted at rest.
- All data must be protected in transit.
- User's expense account number must be visible only to logged in users. All other views of the expense account number should include only the last segment with the remaining parts obscured.
- In the case of a security breach, access to all summary reports must be revoked without impacting other parts of the system.

## Issues

### Upload format issue

Employees occasionally report an issue with uploading a receipt using the web application. They report that when they upload a receipt using the Azure File Share, the receipt does not appear in their profile. When this occurs, they delete the file in the file share and use the web application, which returns a 500 Internal Server error page.

### **Capacity issue**

During busy periods, employees report long delays between the time they upload the receipt and when it appears in the web application.

### **Log capacity issue**

Developers report that the number of log messages in the trace output for the processor is too high, resulting in lost log messages.

### **Processing.cs**



```
PC01 public static class Processing
PC02 {
PC03     public static class Function
PC04     {
PC05         [FunctionName ("IssueWork")]
PC06         public static async Task Run ([TimerTrigger("0 */5" ****")] TimerInfo timer, ILogger log)
PC07         {
PC08             var container = await GetCloudBlobContainer();
PC09             foreach (var fileItem in await ListFiles())
PC10             {
PC11                 var file = new CloudFile (fileItem.StorageUri.PrimaryUri);
PC12                 var ms = new MemoryStream();
PC13                 await file.DownloadToStreamAsync(ms);
PC14                 var blob = container.GetBlockBlobReference (fileItem.Uri.ToString());
PC15                 await blob.UploadFromStreamAsync(ms);
PC16             }
PC17         }
PC18     }
PC19     private static CloudBlockBlob GetDRBlob (CloudBlockBlob sourceBlob)
PC20     {
PC21         . . .
PC22     }
PC23     private static async Task<CloudBlobContainer> GetCloudBlobContainer()
PC24     {
PC25         var cloudBlobClient = new CloudBlobClient (new Uri(" . . ."), await GetCredentials());
PC26
PC27         await cloudBlobClient.GetRootContainerReference().CreatIfNotExistAsync();
PC28         return cloudBlobClient.GetRootContainerReference();
PC29     }
PC30     private static async Task<StorageCredentials> GetCredentials()
PC31     {
PC32         . . .
PC33     }
```

#### Database.cs

```
DB01 public class Database
DB02 {
DB03     private string ConnectionString =
DB04
DB05     public async Task<object> LoadUserDetails(string userId)
DB06     {
DB07
DB08     return await policy.ExecuteAsync (async () =>
DB09     {
DB10         using (var connection = new SqlConnection (ConnectionString))
DB11         {
DB12             await connection.OpenAsync();
DB13             using (var command = new SqlCommand("_", connection))
DB14             using (var reader = command.ExecuteReader())
DB15             {
DB16                 -
DB17             }
DB18         }
DB19     }
DB20 }
DB21 }
```

#### ReceiptUploader.cs

```
RU01 public class ReceiptUploader
RU02 {
RU03     public async Task UploadFile(string file, byte[ ] binary)
RU04     {
RU05         var httpClient = new HttpClient();
RU06         var response = await httpClient.PutAsync( "...", new ByteArrayContent(binary));
RU07         while (ShouldRetry (response))
RU08         {
RU09             response = await httpClient.PutAsync ( "...", new ByteArrayContent(binary));
RU10         }
RU11     }
RU12 private bool ShouldRetry(HttpResponseMessage response)
RU13 {
RU14
RU15     }
RU16 }
```

ConfigureSSE.ps1

```
CS01 $storageAccount = Get-AzureRmStorageAccount -ResourceGroupName "$..." -AccountName "$..."
CS02 $keyVault = Get-AzureRmKeyVault -VaultName "$..."
CS03 $key = Get-AzureKeyVaultKey -VaultName $keyVault.VaultName -Name "$..."
CS04 Set-AzureRmKeyVaultAccessPolicy'
CS05 -VaultName $keyVault.VaultName'
CS06 -ObjectId $storageAccount.Identity.PrincipalId'
CS07
CS08
CS09 Set-AzureRmStorageAccount''
CS10 -ResourceGroupName $storageAccount.ResourceGroupName'
CS11 -AccountName $storageAccount.StorageAccountName'
CS12 -EnableEncryptionService File `
CS13 -KeyvaultEncryption'
CS14 -KeyName $key.Name
CS15 -KeyVersion $key.Version'
CS16 -KeyVaultUri $keyVault.VaultUri
```



#### QUESTION 1

You need to resolve the log capacity issue.

What should you do?

- A. Set a LogCategoryFilter during startup.
- B. Create an Application Insights Telemetry Filter.
- C. Change the minimum log level in the host.json file for the function.
- D. Implement Application Insights Sampling.

**Correct Answer:** D

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario, the log capacity issue: Developers report that the number of log message in the trace output for the processor is too high, resulting in lost log messages.

Sampling is a feature in Azure Application Insights. It is the recommended way to reduce telemetry traffic and storage, while preserving a statistically correct analysis of application data. The filter selects items that are related, so that you can navigate between items when you are doing diagnostic investigations. When metric counts are presented to you in the portal, they are renormalized to take account of the sampling, to minimize any effect on the statistics.

Sampling reduces traffic and data costs, and helps you avoid throttling.

References: <https://docs.microsoft.com/en-us/azure/azure-monitor/app/sampling>

## QUESTION 2

You need to resolve the capacity issue.

What should you do?

- A. Move the Azure Function to a dedicated App Service Plan.
- B. Convert the trigger on the Azure Function to a File Trigger.
- C. Ensure that the consumption plan is configured correctly to allow for scaling.
- D. Update the loop starting on line PC09 to process items in parallel.

**Correct Answer:** D

**Section:** [none]

**Explanation**



### Explanation/Reference:

Explanation:

If you want to read the files in parallel, you cannot use `forEach`. Each of the `async` callback function calls does return a promise. You can await the array of promises that you'll get with `Promise.all`,

Scenario: Capacity issue: During busy periods, employees report long delays between the time they upload the receipt and when it appears in the web application.

```
PC08     var container = await GetCloudBlobContainer();
PC09     foreach (var fileItem in await ListFiles())
PC10     {
PC11         var file = new CloudFile (fileItem.StorageUri.PrimaryUri);
PC12         var ms = new MemoryStream();
PC13         await file.DownloadToStreamAsync(ms);
PC14         var blob = container.GetBlockBlobReference (fileItem.Uri.ToString());
PC15         await blob.UploadFromStreamAsync(ms);
PC16
PC17     }
```

References: <https://stackoverflow.com/questions/37576685/using-async-await-with-a-foreach-loop>

### QUESTION 3

You need to ensure receipt processing occurs correctly.

What should you do?

- A. Use blob metadata to prevent concurrency problems.
- B. Use blob SnapshotTime to prevent concurrency problems.
- C. Use blob leases to prevent concurrency problems.
- D. Use blob properties to prevent concurrency problems.

**Correct Answer:** B

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

You can create a snapshot of a blob. A snapshot is a read-only version of a blob that's taken at a point in time. Once a snapshot has been created, it can be read, copied, or deleted, but not modified. Snapshots provide a way to back up a blob as it appears at a moment in time.

Scenario: Processing is performed by an Azure Function that uses version 2 of the Azure Function runtime. Once processing is completed, results are stored in Azure Blob Storage and an Azure SQL database. Then, an email summary is sent to the user with a link to the processing report. The link to the report must remain valid if the email is forwarded to another user.

References:

<https://docs.microsoft.com/en-us/rest/api/storageservices/creating-a-snapshot-of-a-blob>

### Testlet 3

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### LabelMaker app

Coho Winery produces bottles, and distributes a variety of wines globally. You are developer implementing highly scalable and resilient applications to support online order processing by using Azure solutions.

Coho Winery has a LabelMaker application that prints labels for wine bottles. The application sends **data** to several printers. The application consists of five modules that run independently on virtual machines (VMs). Coho Winery plans to move the application to Azure and continue to support label creation.

External partners send data to the **LabelMaker** application to include artwork and text for custom label designs.

#### Data

You identify the following requirements for data management and manipulation:

- Order data is stored as nonrelational JSON and must be queried using Structured Query Language (SQL).
- Changes to the Order data must reflect immediately across all partitions. All reads to the Order data must fetch the most recent writes.

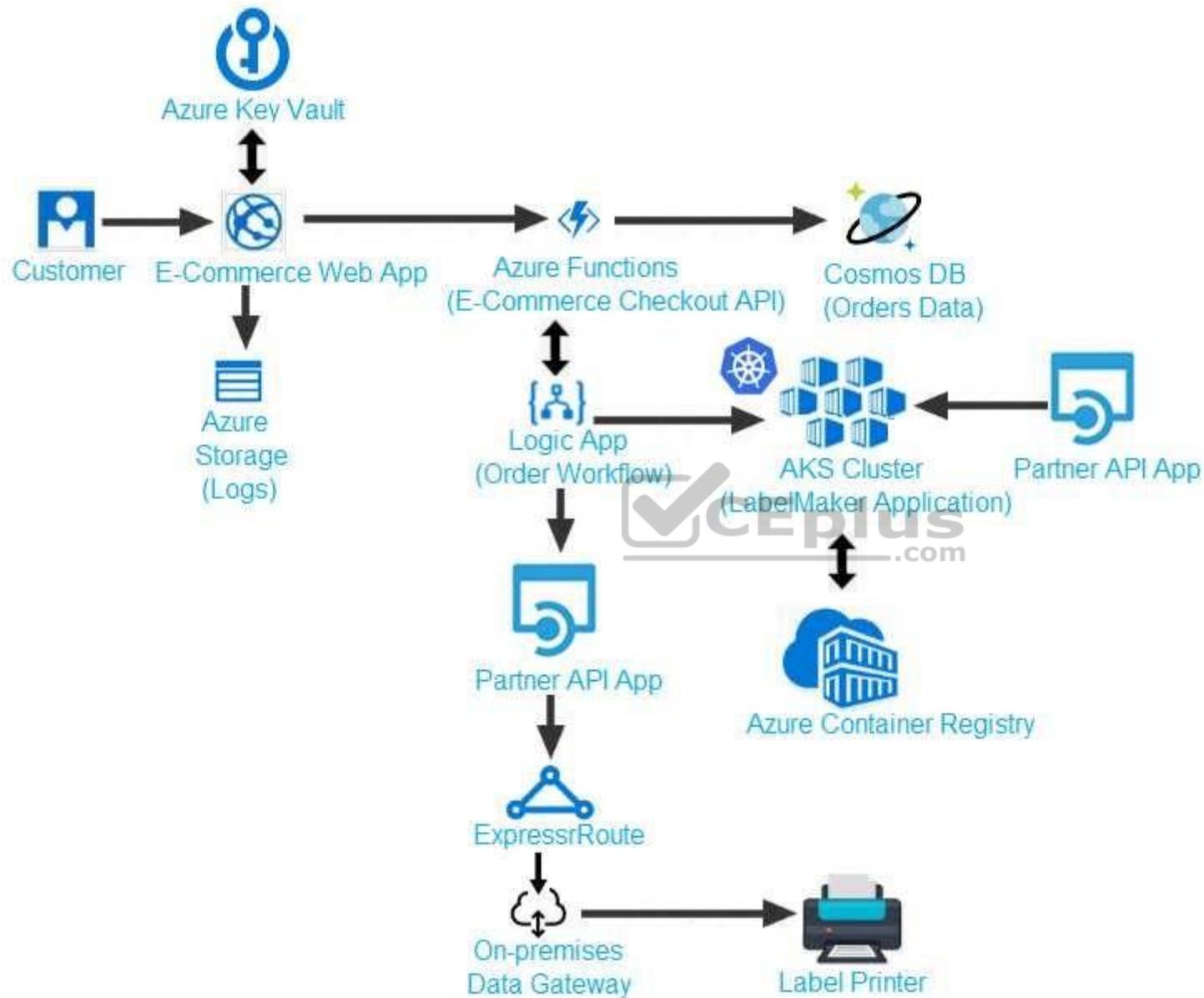
You have the following security requirements:

- Users of Coho Winery applications must be able to provide access to documents, resources, and applications to external partners.
- External partners must use their own credentials and authenticate with their organization's identity management solution.
- External partner logins must be audited monthly for application use by a user account administrator to maintain company compliance.
- Storage of e-commerce application settings must be maintained in Azure Key Vault.
- E-commerce application sign-ins must be secured by using Azure App Service authentication and Azure Active Directory (AAD).
- Conditional access policies must be applied at the application level to protect company content
  - The LabelMaker applications must be secured by using an AAD account that has full access to all namespaces of the Azure Kubernetes Service (AKS) cluster.

#### LabelMaker app

Azure Monitor Container Health must be used to monitor the performance of workloads that are deployed to Kubernetes environments and hosted on Azure Kubernetes Service (AKS).

You must use Azure Container Registry to publish images that support the AKS deployment.



Calls to the Printer API App fail periodically due to printer communication timeouts.

Printer communications timeouts occur after 10 seconds. The label printer must only receive up to 5 attempts within one minute.

The order workflow fails to run upon initial deployment to Azure.

**Order .json**



```
01 {
02   "id" : 1,
03   "customers" : [
04     {
05       "familyName" : "Doe",
06       "givenName" : "John",
07       "customerid" : 5
08     }
09   ],
10   "line_items" : [
11     {
12       "fulfillable_quantity" : 1,
13       "id" : 6,
14       "price" : "199.99",
15       "product_id" : 7513594,
16       "quantity": 1,
17       "requires_shipping" : true,
18       "sku" : "SFC-342-N" ,
19       "title" : "Surface Go",
20       "vendor" : "Microsoft" ,
21       "name" : "Surface Go - 8GB",
22       "taxable" : true
```



### QUESTION 1

You need to troubleshoot the order workflow.

What should you do? Each correct answer presents part of the solution.

**NOTE:** Each correct selection is worth one point.

- A. Review the trigger history.
- B. Review the API connections.
- C. Review the run history.
- D. Review the activity log.

**Correct Answer:** AD

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: The order workflow fails to run upon initial deployment to Azure.

Deployment errors arise from conditions that occur during the deployment process. They appear in the activity log.

References:

<https://docs.microsoft.com/en-us/azure/azure-resource-manager/resource-group-audit>

### Question Set 4

#### QUESTION 1

You are developing an ASP.NET Core Web API web service. The web service uses Azure Application Insights for all telemetry and dependency tracking. The web service reads and writes data to a database other than Microsoft SQL Server.

You need to ensure that dependency tracking works for calls to the third-party database.

Which two Dependency Telemetry properties should you store in the database? Each correct answer presents part of the **solution**.

**NOTE:** Each correct selection is worth one point.

- A. Telemetry.Context.Operation.Id
- B. Telemetry.Name
- C. Telemetry.Context.Cloud.RoleInstance
- D. Telemetry.Context.Session.Id

E. Telemetry.Id

**Correct Answer:** AE

**Section:** [none]

**Explanation**

**Explanation/Reference:**

References: <https://docs.microsoft.com/en-us/azure/azure-monitor/app/custom-operations-tracking>

## QUESTION 2

You are creating a hazard notification system that has a single signaling server which triggers audio and visual alarms to start and stop.

You implement Azure Service Bus to publish alarms. Each alarm controller uses Azure Service Bus to receive alarm signals as part of a transaction. Alarm events must be recorded for audit purposes. Each transaction record must include information about the alarm type that was activated.

You need to implement a reply trail auditing solution.

**NOTE:** Each correct selection is worth one point.

- A. Assign the value of the hazard message MessageId property to the DeliveryCount property.
- B. Assign the value of the hazard message SequenceNumber property to the DeliveryCount property.
- C. Assign the value of the hazard message MessageId property to the SequenceNumber property.
- D. Assign the value of the hazard message MessageId property to the CorrelationId property.
- E. Assign the value of the hazard message SessionID property to the SequenceNumber property..
- F. Assign the value of the hazard message SessionID property to the ReplyToSessionId property.

**Correct Answer:** DF

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

D: CorrelationId: Enables an application to specify a context for the message for the purposes of correlation; for example, reflecting the MessageId of a message that is being replied to.

F: ReplyToSessionId: This value augments the ReplyTo information and specifies which SessionId should be set for the reply when sent to the reply entity.

Incorrect Answers:

A, B: DeliveryCount

Number of deliveries that have been attempted for this message. The count is incremented when a message lock expires, or the message is explicitly abandoned by the receiver. This property is read-only.

C, E: SequenceNumber

The sequence number is a unique 64-bit integer assigned to a message as it is accepted and stored by the broker and functions as its true identifier. For partitioned entities, the topmost 16 bits reflect the partition identifier. Sequence numbers monotonically increase and are gapless. They roll over to 0 when the 48-64 bit range is exhausted. This property is read-only.

References: <https://docs.microsoft.com/en-us/azure/service-bus-messaging/service-bus-messages-payloads>

### QUESTION 3

You develop a gateway solution for a public facing news API. The news API back end is implemented as a RESTful service and uses an OpenAPI specification.

You need to ensure that you can access the news API by using an Azure API Management service instance.

Which Azure PowerShell command should you run?

- A. `Import-AzureRmApiManagementApi -Context $ApiMgmtContext -SpecificationFormat "Swagger" -SpecificationPath $SwaggerPath -Path $Path`
- B. `New-AzureRmApiManagementBackend -Context $ApiMgmtContext -Url $Url -Protocol http`
- C. `New-AzureRmApiManagement -ResourceGroupName $ResourceGroup -Name $Name -Location $Location -Organization $Org -AdminEmail $AdminEmail`
- D. `New-AzureRmApiManagementBackendProxy -Url $ApiUrl`

**Correct Answer: D**

**Section: [none]**

**Explanation**

**Explanation/Reference:**

Explanation:

New-AzureRmApiManagementBackendProxy creates a new Backend Proxy Object which can be piped when creating a new Backend entity.

Example: Create a Backend Proxy In-Memory Object

```
PS C:\>$secpassword = ConvertTo-SecureString "PlainTextPassword" -AsPlainText -Force
```

```
PS C:\>$proxyCreds = New-Object System.Management.Automation.PSCredential ("foo", $secpassword)
```

```
PS C:\>$credential = New-AzureRmApiManagementBackendProxy -Url "http://12.168.1.1:8080" -ProxyCredential $proxyCreds
```

```
PS C:\>$apimContext = New-AzureRmApiManagementContext -ResourceGroupName "Api-Default-WestUS" -ServiceName "contoso"
```

```
PS C:\>$backend = New-AzureRmApiManagementBackend -Context $apimContext -BackendId 123 -Url 'https://contoso.com/awesomeapi' -Protocol http -Title "first backend" -SkipCertificateChainValidation $true -Proxy $credential -Description "backend with proxy server" Creates a Backend Proxy Object and sets up Backend
```

Incorrect Answers:

A: The Import-AzureRmApiManagementApi cmdlet imports an Azure API Management API from a file or a URL in Web Application Description Language (WADL), Web Services Description Language (WSDL), or Swagger format.

B: New-AzureRmApiManagementBackend creates a new backend entity in Api Management.

C: The New-AzureRmApiManagement cmdlet creates an API Management deployment in Azure API Management.

References: <https://docs.microsoft.com/en-us/powershell/module/azurerm.apimanagement/new-azurermapimanagementbackendproxy?view=azurermps-6.13.0>

#### QUESTION 4

DRAG DROP

You develop a web app that uses the tier D1 app service plan by using the Web App feature of Microsoft Azure App Service.

Spikes in traffic have caused increases in page load times.

You need to ensure that the web app automatically scales when CPU load is about 85 percent and minimize costs.

Which four actions should you perform in sequence? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

**NOTE:** More than one order of answer choices is correct. You will receive credit for any of the correct orders you select.

Select and Place:

Actions	Answer Area
Enable autoscaling on the web app.	
Configure a Scale condition.	
Configure the web app to the Standard App Service tier.	⏪
Configure the web app to the Premium App Service tier.	⏩
Switch to an Azure App Services consumption plan.	⏩
Add a Scale rule.	⏴

Correct Answer:

Actions	Answer Area
Enable autoscaling on the web app.	Configure the web app to the Standard App Service tier
Configure a Scale condition	Enable autoscaling on the web app.
Configure the web app to the Standard App Service tier.	Add a Scale rule.
Configure the web app to the Premium App Service tier.	Configure a Scale condition
Switch to an Azure App Services consumption plan	
Add a Scale rule	

**Section: [none]**

**Explanation**

**Explanation/Reference:**

Explanation:

Step 1: Configure the web app to the Standard App Service Tier  
The Standard tier supports auto-scaling, and we should minimize the cost.

Step 2: Enable autoscaling on the web app  
First enable autoscale

Step 3: Add a scale rule Step 4:

Add a Scale condidation

References:

<https://docs.microsoft.com/en-us/azure/monitoring-and-diagnostics/monitoring-autoscale-get-started> <https://azure.microsoft.com/en-us/pricing/details/app-service/plans/>

### QUESTION 5

You are developing a project management service by using ASP.NET. The service hosts conversations, files, to-do lists, and a calendar that users can interact with at any time.

The application uses Azure Search for allowing users to search for keywords in the project data.

You need to implement code that creates the object which is used to create indexes in the Azure Search service.

Which two objects should you use? Each correct answer presents part of the solution.

**NOTE:** Each correct selection is worth one point.

- A. SearchCredentials
- B. SearchIndexClient
- C. SearchServiceClient
- D. SearchService

**Correct Answer:** BC

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

The various client libraries define classes like Index, Field, and Document, as well as operations like Indexes.Create and Documents.Search on the SearchServiceClient and SearchIndexClient classes.

Example:

The sample application we'll be exploring creates a new index named "hotels", populates it with a few documents, then executes some search queries. Here is the main program, showing the overall flow:

```
/ This sample shows how to delete, create, upload documents and query an index
static void Main(string[] args)
{
    IConfigurationBuilder builder = new ConfigurationBuilder().AddJsonFile("appsettings.json");
    IConfigurationRoot configuration = builder.Build();

    SearchServiceClient serviceClient = CreateSearchServiceClient(configuration);

    Console.WriteLine("{0}", "Deleting index...\n");
    DeleteHotelsIndexIfExists(serviceClient);

    Console.WriteLine("{0}", "Creating index...\n");
    CreateHotelsIndex(serviceClient);

    ISearchIndexClient indexClient = serviceClient.Indexes.GetClient("hotels");
}
```

References:

<https://docs.microsoft.com/en-us/azure/search/search-howto-dotnet-sdk>

## Testlet 1

### Case Study

This is a case study. Case studies are not timed separately. You can use as much exam time as you would like to complete each case. However, there may be additional case studies and sections on this exam. You must manage your time to ensure that you are able to complete all questions included on this exam in the time provided.

To answer the questions included in a case study, you will need to reference information that is provided in the case study. Case studies might contain exhibits and other resources that provide more information about the scenario that is described in the case study. Each question is independent of the other question on this case study.

At the end of this case study, a review screen will appear. This screen allows you to review your answers and to make changes before you move to the next sections of the exam. After you begin a new section, you cannot return to this section.

### To start the case study

To display the first question on this case study, click the **Next** button. Use the buttons in the left pane to explore the content of the case study before you answer the questions. Clicking these buttons displays information such as business requirements, existing environment, and problem statements. If the case study has an **All Information** tab, note that the information displayed is identical to the information displayed on the subsequent tabs. When you are ready to answer a **question**, click the Question button to return to the question.

### Background

You are a developer for Proseware, Inc. You are developing an application that applies a set of governance policies for Proseware's internal services, external services, and applications. The application will also provide a shared library for common functionality.

### Policy service

You develop and deploy a stateful ASP.NET Core 2.1 web application named Policy service to an Azure App Service Web App. The application reacts to events from Azure Event Grid and performs policy actions based on those events.

The application must include the Event Grid Event ID field in all Application Insights telemetry.

Policy service must use Application Insights to automatically scale with the number of policy actions that it is performing.

### Other

#### Anomaly detection service

You have an anomaly detection service that analyzes log information for anomalies. It is implemented as an Azure Machine Learning model. The model is deployed as a web service.

If an anomaly is detected, an Azure Function that emails administrators is called by using an HTTP WebHook.

#### Health monitoring

All web applications and services have health monitoring at the /health service endpoint.

## **Issues**

### **Policy loss**

When you deploy Policy service, policies may not be applied if they were in the process of being applied during the deployment.

### **Performance issue**

When under heavy load, the anomaly detection service undergoes slowdowns and rejects connections.

### **Notification latency**

Users report that anomaly detection emails can sometimes arrive several minutes after an anomaly is detected.

## **Policies**

### **Log policy**

All Azure App Service Web Apps must write logs to Azure Blob storage. All log files should be saved to a container named logdrop. Logs must remain in the container for 15 days.

### **Authentication events**

Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.

### **PolicyLib**

You have a shared library named PolicyLib that contains functionality common to all ASP.NET Core web services and applications. The PolicyLib library must:

- Exclude non-user actions from Application Insights telemetry.
- Provide methods that allow a web service to scale itself.
- Ensure that scaling actions do not disrupt application usage.

Relevant portions of the app files are shown below. Line numbers are included for reference only and include a two-character prefix that denotes the specific file to which they belong.

### EventGridController.cs

```
EG01 public class EventGridController : Controller
EG02 {
EG03     public static AsyncLocal<string> EventId = new AsyncLocal<string>();
EG04     public IActionResult Process([FromBody] string eventsJson)
EG05     {
EG06         var events = JObject.Parse(eventsJson);
EG07
EG08         foreach (var @event in events)
EG09         {
EG10             EventId.Value = @event["id"].ToString();
EG11             if (@event["topic"].ToString(). Contains("providers/Microsoft.Storage"))
EG12             {
EG13                 SendToAnomalyDetection Service(@event["data"]["url"].ToString());
EG14             }
EG15
EG16             {
EG17                 EnsureLogging(@event["subject"].ToString());
EG18             }
EG19         }
EG20         return null;
EG21     }
EG22     private void EnsureLogging(string resource)
EG23     {
EG24         . . .
EG25     }
EG26     private async Task SendToAnomalyDetectionService(string uri)
EG27     {
EG28         var content = GetLogData(uri)
EG29         var scoreRequest = new
EG30         {
EG31             Inputs = new Dictionary<string, List<Dictionary<string, string>>>()
EG32             {
EG33                 {
EG34                     "input1",
```

Relevant portions of the app files are shown below. Line numbers are included for reference only and include a two-character prefix that denotes the specific file to which they belong.

#### LoginEvent.cs

```
LE01 public class LoginEvent
LE02 {
LE03
LE04 public string subject { get ; set ; }
LE05 public DateTime eventTime { get ; set ; }
LE06 public Dictionary<string, string> data { get; set; }
LE07 public string Serialize()
LE08 {
LE09     return JsonConvert.SerializeObject(this);
LE10 }
LE11 }
```

#### QUESTION 1

**Note:** This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.

**After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.**

You need to ensure that authentication events are triggered and processed according to the policy.

Solution: Create a new Azure Event Grid topic and add a subscription for the events.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer:** B

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Instead ensure that signout events have a subject prefix. Create an Azure Event Grid subscription that uses the subjectBeginsWith filter.

Scenario: Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.

## QUESTION 2

**Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.**

**After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.**

You need to ensure that authentication events are triggered and processed according to the policy.

Solution: Create separate Azure Event Grid topics and subscriptions for sign-in and sign-out events.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer: B**

**Section: [none]**

**Explanation**

**Explanation/Reference:**

Explanation:

Instead ensure that signout events have a subject prefix. Create an Azure Event Grid subscription that uses the subjectBeginsWith filter.

Scenario: Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.

## QUESTION 3

**Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.**

**After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.**

You need to ensure that authentication events are triggered and processed according to the policy.

Solution: Ensure that signout events have a subject prefix. Create an Azure Event Grid subscription that uses the subjectBeginsWith filter.

Does the solution meet the goal?

- A. Yes



B. No

**Correct Answer:** A

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Scenario: Authentication events are used to monitor users signing in and signing out. All authentication events must be processed by Policy service. Sign outs must be processed as quickly as possible.

References:

<https://docs.microsoft.com/en-us/azure/event-grid/subscription-creation-schema>



## Question Set 2

### QUESTION 1

**Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.**

**After you answer a question in this question, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.**

Margie's Travel is an international travel and bookings management service. The company is expanding into restaurant bookings. You are tasked with implementing Azure Search for the restaurants listed in their solution.

You create the index in Azure Search.

You need to import the restaurant data into the Azure Search service by using the Azure Search .NET SDK.

Solution:

1. Create a SearchServiceClient object to connect to the search index.
2. Create a DataContainer that contains the documents which must be added.
3. Create a DataSource instance and set its Container property to the DataContainer.
4. Call the Documents.Suggest method of the SearchIndexClient and pass the DataSource.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer: B**

**Section: [none]**

**Explanation**

**Explanation/Reference:**

Explanation: Use the following method:

1. - Create a SearchIndexClient object to connect to the search index
2. - Create an IndexBatch that contains the documents which must be added.
3. - Call the Documents.Index method of the SearchIndexClient and pass the IndexBatch.

References: <https://docs.microsoft.com/en-us/azure/search/search-howto-dotnet-sdk>

### QUESTION 2

**Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.**

**After you answer a question in this question, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.**

Margie's Travel is an international travel and bookings management service. The company is expanding into restaurant bookings. You are tasked with implementing Azure Search for the restaurants listed in their solution.

You create the index in Azure Search.

You need to import the restaurant data into the Azure Search service by using the Azure Search .NET SDK.

Solution:

1. Create a SearchIndexClient object to connect to the search index
2. Create an IndexBatch that contains the documents which must be added.
3. Call the Documents.Index method of the SearchIndexClient and pass the IndexBatch.

Does the solution meet the goal?

- A. Yes
- B. No



**Correct Answer: A**

**Section: [none]**

**Explanation**

**Explanation/Reference:**

Explanation:

1. The index needs to be populated. To do this, we will need a SearchIndexClient. There are two ways to obtain one: by constructing it, or by calling Indexes.GetClient on the SearchServiceClient. Here we will use the first method.

2. Create the indexBatch with the documentsSomething like: var hotels = new Hotel[];

```
{
new Hotel()
{
    HotelId = "3",
    BaseRate = 129.99,
    Description = "Close to town hall and the river"
}
```

```
    }  
};  
...  
var batch = IndexBatch.Upload(hotels);
```

3. The next step is to populate the newly-created index

Example:

```
var batch = IndexBatch.Upload(hotels);
```

```
try  
{  
    indexClient.Documents.Index(batch);  
}
```

References: <https://docs.microsoft.com/en-us/azure/search/search-howto-dotnet-sdk>

### QUESTION 3

A company is implementing a publish-subscribe (Pub/Sub) messaging component by using Azure Service Bus. You are developing the first subscription application.

In the Azure portal you see that messages are being sent to the subscription for each topic. You create and initialize a subscription client object by supplying the correct details, but the subscription application is still not consuming the messages.

You need to complete the source code of the subscription client

What should you do?

- A. `await subscriptionClient.CloseAsync();`
- B. `await subscriptionClient.AddRuleAsync(new RuleDescription(RuleDescription.DefaultRuleName, new TrueFilter()));`
- C. `subscriptionClient.RegisterMessageHandler(ProcessMessagesAsync, messageHandlerOptions);`
- D. `subscriptionClient = new SubscriptionClient(ServiceBusConnectionString, TopicName, SubscriptionName);`

**Correct Answer: C**

**Section: [none]**

**Explanation**

**Explanation/Reference:**

Explanation:

Using topic client, call RegisterMessageHandler which is used to receive messages continuously from the entity. It registers a message handler and begins a new thread to receive messages. This handler is waited on every time a new message is received by the receiver.  
subscriptionClient.RegisterMessageHandler(ReceiveMessagesAsync, messageHandlerOptions);

References: <https://www.c-sharpcorner.com/article/azure-service-bus-topic-and-subscription-pub-sub/>

#### QUESTION 4

##### HOTSPOT

You are developing a .NET Core MVC application for customers to research hotels. The application will use Azure Search. The application will search the index by using various criteria to locate documents related to hotels. The index will include search fields for rate, a list of amenities, and distance to the nearest airport.

The application must support the following scenarios for specifying search criteria and organizing results:

- Search the index by using regular expressions.
- Organize results by counts for name-value pairs.
- List hotels within a specified distance to an airport and that fall within a specific price range.

You need to configure the SearchParameters class.

Which properties should you configure? To answer, select the appropriate options in the answer area.

**NOTE:** Each correct selection is worth one point.

**Hot Area:**

## Answer Area

Scenario	Property								
Search the index by using regular expressions.	<table border="1"><tr><td></td><td>▼</td></tr><tr><td>QueryType</td><td></td></tr><tr><td>OrderBy</td><td></td></tr><tr><td>SearchMode</td><td></td></tr></table>		▼	QueryType		OrderBy		SearchMode	
	▼								
QueryType									
OrderBy									
SearchMode									
Organize results by counts for name-value pairs.	<table border="1"><tr><td></td><td>▼</td></tr><tr><td>Facets</td><td></td></tr><tr><td>Filter</td><td></td></tr><tr><td>SearchMode</td><td></td></tr></table>		▼	Facets		Filter		SearchMode	
	▼								
Facets									
Filter									
SearchMode									
List hotels within a specified distance to an airport and that fall within a specific price range.	<table border="1"><tr><td></td><td>▼</td></tr><tr><td>Order by</td><td></td></tr><tr><td>Top</td><td></td></tr><tr><td>Filter</td><td></td></tr></table>		▼	Order by		Top		Filter	
	▼								
Order by									
Top									
Filter									

Correct Answer:

## Answer Area

Scenario	Property
Search the index by using regular expressions.	<div style="border: 1px solid black; padding: 2px;"> <div style="background-color: #cccccc; padding: 2px; display: flex; justify-content: flex-end; align-items: center;">▼</div> <ul style="list-style-type: none"> <li style="background-color: #d9ead3; padding: 2px;">QueryType</li> <li style="padding: 2px;">OrderBy</li> <li style="padding: 2px;">SearchMode</li> </ul> </div>
Organize results by counts for name-value pairs.	<div style="border: 1px solid black; padding: 2px;"> <div style="background-color: #cccccc; padding: 2px; display: flex; justify-content: flex-end; align-items: center;">▼</div> <ul style="list-style-type: none"> <li style="background-color: #d9ead3; padding: 2px;">Facets</li> <li style="padding: 2px;">Filter</li> <li style="padding: 2px;">SearchMode</li> </ul> </div>
List hotels within a specified distance to an airport and that fall within a specific price range.	<div style="border: 1px solid black; padding: 2px;"> <div style="background-color: #cccccc; padding: 2px; display: flex; justify-content: flex-end; align-items: center;">▼</div> <ul style="list-style-type: none"> <li style="padding: 2px;">Order by</li> <li style="padding: 2px;">Top</li> <li style="background-color: #d9ead3; padding: 2px;">Filter</li> </ul> </div>

**Section:** [none]

**Explanation**

**Explanation/Reference:**

Explanation:

Box 1: QueryType

The SearchParameters.QueryType Property gets or sets a value that specifies the syntax of the search query. The default is 'simple'. Use 'full' if your query uses the Lucene query syntax.

You can write queries against Azure Search based on the rich Lucene Query Parser syntax for specialized query forms: wildcard, fuzzy search, proximity search, regular expressions are a few examples.

Box 2: Facets

The facets property gets or sets the list of facet expressions to apply to the search query. Each facet expression contains a field name, optionally followed by a comma-separated list of name:value pairs.

Box 3: Filter

The Filter property gets or sets the OData \$filter expression to apply to the search query.

References:

<https://docs.microsoft.com/en-us/dotnet/api/microsoft.azure.search.models.searchparameters> <https://docs.microsoft.com/en-us/azure/search/query-lucene-syntax> <https://docs.microsoft.com/en-us/dotnet/api/microsoft.azure.search.models.searchparameters.querytype>

### QUESTION 5

**Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.**

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You create the index in Azure Search.

You need to import the restaurant data into the Azure Search service by using the Azure Search .NET SDK.

Solution:

1. Create a SearchIndexClient object to connect to the search index.
2. Create a DataContainer that contains the documents which must be added.
3. Create a DataSource instance and set its Container property to the DataContainer.
4. Call the Documents.Suggest method of the SearchIndexClient and pass the DataSource.

Does the solution meet the goal?

- A. Yes
- B. No

**Correct Answer: B**

**Section: [none]**

**Explanation**

**Explanation/Reference:**

Explanation:

Use the following method:

1. - Create a SearchIndexClient object to connect to the search index
2. - Create an IndexBatch that contains the documents which must be added.
3. - Call the Documents.Index method of the SearchIndexClient and pass the IndexBatch.

References: <https://docs.microsoft.com/en-us/azure/search/search-howto-dotnet-sdk>



<https://www.vceplus.com/>

